

electrode comprising a pen-like device consisting of a metal tip and measuring the resulting small electrical current based upon the applied voltage between the electrodes;

(b) means for converting an analog signal indicative of the measured current to a corresponding ac impedance signal;

(c) a ~~potentiostat's~~ microcomputer with an operational program representative of a functional expression which correlates to distinctive impedance spectra; and

(d) means for ~~comparing~~ ^{comparing} the impedance spectrum as a function of accelerated exposure and interpreting the said spectrum to determine the stage of corrosion the metal and/or coating has experienced.

ABSTRACT OF THE DISCLOSURE

A hand-held corrosion sensor is described that uses electrochemical impedance spectroscopy (EIS, also known as AC impedance) to detect coating degradation and corrosion of coated and uncoated metals. The hand-held sensor is pressed against the surface of the structure or specimen to be inspected. An EIS spectrum can then be obtained in the field or under arbitrary conditions and the degree of coating or material degradation can be determined from the resultant spectrum. There are no restrictions on the configuration of the structure being inspected. The area of detection is controlled by controlling the extent and degree of wetness of the surface. A dry surface will provide a localized measurement; a wet surface will allow inspection of the wetted area.